Revisiting the Relationship between Contract Governance and Contractors' Opportunistic Behavior in Construction Projects

Abstract: Contracts act as a major tool in curbing opportunism, which is common phenomenon in construction projects. This research differentiates contractual mechanisms of obligatoriness, monitoring and coordination, and studies the relationship between complexity of above functions and different types of opportunistic behavior. Using data from 262 owners (the party issuing the contract) in Chinese construction industry, this research reveals that contractual obligatoriness has negative effect on strong form opportunistic behavior, while contractual monitoring and coordination have positive and negative effect on weak form opportunistic behavior, respectively. Furthermore, we find that goodwill trust acts as a mediator in explaining contractual coordination's effect on weak form opportunistic behavior. This research makes contributions to both the contract management literature and the interorganizational relationship governance literature by providing more nuanced findings that speak to the debate surrounding the relationship between contractual governance and opportunistic behavior, and elaborate the mediation mechanism and provide insights into the contractual function view.

Managerial relevance statement: This research has two managerial implications. Firstly, it provides guidance for contract designing. Conventional wisdom posits that managers should design more explicit contracts to curb both parties' opportunistic behavior. However, this research indicates that construction companies should be cautious in using different contractual functions. On the one hand, the binding force

of the contract should be strengthened appropriately to generate deterrent force through obligatoriness. On the other hand, managers should pay attention to monitoring-based contractual provisions which have the potential of nurturing contractors' opportunistic behavior in weak form. Owners should let coordination go with them to reduce weak form opportunism from motivation. Since the improvement process of contracting may curb opportunistic behavior in some ways, learning from previous contracts, especially failed ones, is encouraged for owners. Secondly, contract managers should keep a weather eye on practical behaviors or conflicts derived from opportunism and employ pointed mechanism. With regard to mitigating contractors' weak form opportunistic behavior, relational governance like trust is more preferable. Coordination efforts or shared norms should be developed and enhanced through contracts or someway else in dealing with this type of opportunistic behavior, which is less observable but more durable.

Keywords: Contract governance, contractual complexity, opportunistic behavior, goodwill trust, construction projects

Introduction

Opportunism that can result in disruptions and conflicts is viewed as a barrier to the success of inter-organizational transactions, such as constructions projects (Boukendour, 2007; Cheung and Yiu, 2006). Contracts, using control and coordination mechanisms typically (e.g. Dekker, 2004; Mellewigt et al., 2007), serve as a main instrument for dealing with opportunistic behavior (e.g. Wei et al., 2017).

Although how contract design impacts opportunistic behavior has gained considerable research attention (e.g. Cavusgil et al., 2004; John, 1984; Liu et al., 2009), consistent findings are far from being reached.

Some empirical studies have found that, by making the exchange contractually explicit and specifying precise behavioral boundaries before the exchange, the detailed contract is viewed as the major instrument that protects specific investments from opportunistic behavior (e.g. Parkhe, 1993; Dahlstrom and Nygaard, 1999; Liu et al., 2009). However, there are also empirical studies confirming that contractual governance has no significant effect on opportunism (Cavusgil et al., 2004; Lu et al., 2014). Besides, another point of view has suggested that perceptions of increased formalization and controls, like rule enforcement and surveillance, may lead to an erosion of positive attitudes and consequently to more opportunism (Ghoshal and Moran, 1996; John, 1984). With these inconsistent conclusions, it is still not clear how opportunism can be effectively governed using contracts.

This research revisits the relationship between contractual governance and opportunistic behaviors in the construction project context, and aims at seeking for explanation and conciliation for these contradictory findings. We argue that one driver for the inconsistency in the literature is that some studies may have just focused on a certain aspect of the constructs (i.e. the contract design features and opportunism) but drawn a conclusion at the overall level, while neither contractual governance or opportunistic behavior is single-facet. To clarify the relationship between the design feature of the contract and opportunism, one possible way is to investigate the

66 relevant constructs in a more nuanced way by taking different aspects of contract
67 design and opportunism into consideration.

68 For opportunism, Luo's (2006) conceptual study has addressed the dimensions of
69 strong and weak forms of opportunism, and empirical studies have strengthened the
70 necessity of subtle research (Lumineau and Quelin, 2012; Luo et al., 2015). It is
71 important to investigate the different effects of governance mechanisms in restraining
72 each form of opportunistic behavior in construction projects. On the other hand,
73 contracts may show divergent design features in different dimensions. Building on the
74 previous studies that analyze the control and coordination mechanisms of the contract
75 (e.g. Lumineau and Quelin, 2012) and taking a step further, this research argues that
76 contractual control itself may have different effects (Heide et al., 2007) when it comes
77 to contractors' opportunistic behavior in construction projects. Inspired by the
78 management control literature which distinguishes between the different properties of
79 behavior-based control and outcome-based control and receives fruitful research
80 insights (Bai et al., 2016; Jensen and Meckling, 1992), we argue that contractual
81 control has two different mechanisms, namely obligatoriness and monitoring, that
82 may exert different effects on contractors' opportunism. Adding contractual
83 coordination, the design features of construction contracts are thus examined from
84 three aspects in this research.

85 To sum up, this paper aims to reconcile the aforementioned inconsistency and
86 address the following research question: *How do the design features of contracts'*
87 *different dimensions influence the occurrence of different types of contractor's*

opportunistic behavior in a construction project? Using a survey dataset of 262 responses from clients in the Chinese construction industry, we find that contractual obligatoriness can effectively curb contractor's strong form opportunistic behaviors. Whilst, contractual monitoring will induce more weak form opportunistic behaviors, and the coordination function of the contact can help deal with weak form opportunism. In addition, we found evidence that goodwill trust between the client and the contractor plays a significant role in explaining the influence of contractual coordination on contractor's weak form opportunistic behaviors.

This research contributes to the contract management literature by distinguishing the control function of formal contracts into contractual obligatoriness and monitoring, and argue that they have different properties in governing interorganizational transactions. This research also makes contributions to the interorganizational relationship governance literature by showing how each aspect of formal contracts influence different types of opportunistic behaviors. The conclusions of this paper thus provide more nuanced knowledge regarding the discussion on contract-opportunism relationship in the current literature.

Theoretical background

Opportunistic behavior

Defined as "self-interest seeking with guile", opportunism is a central concept in the study of transaction cost and is especially important for economic activities that

involve asset specificity (Williamson, 1985). Previous conceptualization like "lying, stealing, cheating, and calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse" (Williamson, 1985) has been described as "blatant" opportunism (Masten 1988). In contrast, the term "lawful opportunism" is used to define deceitful behavior that doesn't pertain to the formal contract (Wathne and Heide, 2000). Similarly, Luo (2006) differentiates weak form opportunism from strong form. In this research, contractors' opportunistic behavior is defined as "behaviors aimed at pursuing self-interest with deceit to achieve gains at the expense of the owner by withdrawing promises, shirking obligations, and breaching explicit or implicit agreements" (Das and Rahman, 2010; Lu et al., 2016; Luo, 2006), and it is viewed as a two-aspect construct. Strong form opportunistic behavior includes actions that violate contractual norms (terms, clauses, and conditions) that are explicitly codified in the main body of a contract as well as in its supplements (Luo, 2006, 2015), whereas weak form opportunistic behavior involves behaviors that violate relational norms not spelled out in a contract but embedded in the common understanding of both parties (Luo, 2006, 2015).

With high complexity and asset specificity, construction projects are minefields for opportunistic behavior (Pang et al., 2015). Due to information asymmetry, behaviors like underbidding or lying are common in construction projects (Wang et al., 2007), making adverse selection a serious problem. This research focuses on contractors' ex-post opportunistic behavior, namely moral hazard problems like withholding or distorting information, shirking obligations, and reneging on explicit

131 or implicit commitments during the contract period. Moreover, contractors may make
132 use of uncertainty and owners' vulnerability to delay or even strike to receive a
133 compromise from the owner, causing hold-up problems (Chang and Ive, 2007). It is
134 also common to find contractors making use of the loopholes in the contract to raise
135 claims and recoup loss due to excessive risk-taking (Pang et al., 2015). Unclear work
136 scope, insufficient details or missing items all lead to opportunism (Pang et al., 2015),
137 especially weak form opportunism that cheats at the margins. Thus, it is imperative
138 for project owners to establish effective governance mechanisms to safeguard from
139 contractors' opportunistic behavior and reduce ex-post transaction costs.

140 **Contractual governance and the dimensions**

141 Contracts are the prominent governance mechanism to safeguard against
142 opportunism and minimize the transaction cost (Williamson, 1985). For construction
143 projects, devising appropriate contracts is essential to construction project success.
144 Many researches have explored the role of contracts in construction projects. What
145 has been frequently discussed is the effect of different contract type choices (e.g.
146 guaranteed maximum price contracts, fixed price contracts, time and materials types
147 of contracts) on project performance (e.g. Chan, et al., 2012; Jørgensen et al., 2017;
148 Suprapto et al., 2016; Turner and Simister, 2001) and bidder competitiveness
149 (Chapman and Ward, 2008; Drew and Skitmore, 1997), as well as the influence of
150 some specific terms and clauses and contract features on risk reduction (Hutchens,
151 1992), flexibility (Demirel et al., 2017) and other aspects of projects. Another steam

of research relating to contracts in construction projects focuses on mechanism design which aims to devise approaches and incentives to realize optimal outcomes or make participants behave in a desired manner (e.g., Boukendour, 2007; Boukendour and Bah, 2001; Mahdi Hosseinian and Carmichael, 2014).

Beyond the traditional concerns and perspectives above, some research moves to a more broad and strategic direction, treating contract as a formal mechanism to govern the relationship and behavior between collaborating parties to explore the relationship between contract strategy and project performance (e.g. Ke et al., 2013), and the synergy between contract and other governance mechanisms (e.g. Oliveira and Lumineau, 2017). Recently, with the development of contractual function perspective in inter-organizational transaction research field, much attention has been drawn to the multiple aspects of contracts (e.g. Benaroch et al., 2016; Malhotra and Lumineau, 2011). This appeals to scholars to investigate the level of complexity of contractual functions in various industrial sectors, including in the context of construction projects (Gao et al., 2018; Wang et al., 2017; You et al., 2018). A more complex contract would offer better guidelines for solving ex-post problems (Reuer and Arino, 2007), and the complexity of contracts has long been studied (e.g. Barthélemy and Quélin, 2006; Ding et al., 2013; Reuer and Arino, 2007; Wuyts and Geyskens, 2005).

Contracts are designed to mitigate inter-organizational risks like relational risks, which refer to the possibility that partners do not act cooperatively owing to misaligned interests, and performance risks, which refer to the possibility that the

objective of the transaction could still be under-realized even with full cooperation (Das and Teng, 2001). In the presence of opportunism or relational risks, transaction parties have to elaborate contracts to monitor behaviors, safeguard assets, and ensure that both parties fulfill their responsibilities. In particular, empirical research on TCE emphasizes the control function of contracts in safeguarding against opportunism (Benaroch et al., 2016; Schepker et al., 2014). In the meantime, researchers have a broader view of contracts and extend the function of contracts to coordination (Klein Woolthuis et al., 2005; Mellewigt et al. 2007; Reuer and Ariño 2007) in dealing with performance risks that derives from the misaligned expectation rather than misaligned interest (Gulati et al., 2012). In this research, we argue that contractual coordination also has the potential of dealing with some kinds of relational risk. We use contractual coordination to refer to the level of detail of the contract terms incorporated to align the expectations of transacting parties, avoid "honest mistakes", and minimize inefficiencies (Mayer and Argyres, 2004).

Inspired by the management control literature, in this research we intend to distinguish the control function of formal contracts in a more nuanced way. The management control literature has long documented two different ways of control, namely outcome control and behavior control (Anderson and Oliver, 1987; Dekker, 2004; Liu, 2015). Outcome control refers to the approach using explicit goals of outcome to reward or punish the parties, while behavior control relies more on monitoring the process or activities (Anderson and Oliver, 1987; Bai et al., 2016). Differencing these two ways of control is important as they may have different

196 influence on subsequent transactions. For example, Bai et al., (2016) show that
197 outcome-based and behavior-based contract have divergent effect on buy-supply
198 conflict in supply chains.

199 We argue that these two different control approaches reflect different
200 philosophies in formal contracts. For example, in a construction contract, it can be
201 stipulated that the client should pay to the contractor at some milestones, or the client
202 will get punished if they fail to pay on time. The contract can also stipulate what kind
203 of project quality should be delivered, or the contractor will be punished if the quality
204 does not meet the requirements. In this way of explicitly delineating the goals as well
205 as the according rights or punishments, the transacting parties are exploiting the
206 benefit of easy-enforceability of using a formal contract (Cao and Lumineau, 2015).
207 Once the rights and obligations are clearly defined, the collaborating parties are
208 actually relying on the legal system to protect the transaction. We name this way of
209 contractual control as contractual obligatoriness, and suggest that the extent to which
210 the contract party is restrained by the binding force of the contract is varied (Luo,
211 2006).

212 On the other hand, the collaborating parties can stipulate in the contract how one
213 party monitors the other's behaviors. For example, in a construction contract, the
214 client can incorporate his right to monitor the contractor's behavior in realizing major
215 goals of a construction project, including cost, time, quality, or health, safety, and
216 environment (HSE). Using this way of control, the collaborating parties are not
217 directly benefiting from the easy-enforceability of the formal contract, but using

contract to justify the surveillance right of one party on the process or activities of the partner. In this way, the controlling party is benefiting from its own monitoring effort. We name this way of control in a formal contract as contractual monitoring, and argue that the extent to which the owner's rights to observe its contractors are codified in the contract is varied (Kashyap and Murtha, 2016; Reuer and Ariño 2007).

As will be discussed in more detail in the next section, it is relevant to our research purpose to distinguish between these two approaches because they will exert very different effects on contractors' opportunistic behaviors. For this research, we use contractual obligatoriness, contractual monitoring, and contractual coordination to represent the different governance approaches in a formal contract.

Hypotheses development

Lusch and Brown (1996) suggest that contracts will undoubtedly influence behavior. Existing research on the effect of contracts on contractor's opportunistic behavior in construction projects reach inconsistent conclusions. Some research reveals that contracts prevent contractor's opportunistic behavior (You et al., 2018). On the other hand, contracts are found in other research to make no difference in mitigating opportunism (Lu et al., 2015). Lu et al. (2016) have found that different contract dimensions exert different effects on contractor's opportunistic behavior. We agree that the contract is a governance mechanism with multiple dimensions, each of which has its unique purpose and features, thus have different governance effect.

A party's opportunistic behavior results from both its motivation to do so and its capability of doing so without being detected and sanctioned (Dong et al., 2014). Nooteboom (1996) mentioned three ways to mitigate rational risks. Firstly, monitoring to detect cheating and sanctions as a measure of enforcement are essential to restrict chances for opportunism. Secondly, incentive control is necessary to limit incentives to utilize opportunities for opportunism. Moreover, benevolence based on established social norms can limit inclinations towards opportunism (Klein Wolthuis et al., 2005). Combined with the view of contractual function mentioned above, hypotheses are developed in this research.

The traditional TCE-based 'safeguarding' function is the very accepted motivation for writing contracts (Williamson, 1985). Complex obligatoriness clauses offer a way to safeguard against opportunistic behavior. Firstly, contracts define the parties' obligations in black and white, specify acceptable behaviors and unacceptable behaviors (Lui and Ngo, 2004) and set the boundaries for the judgment of opportunistic behavior (Kashyap and Murtha, 2016). Secondly, contracts play an obligatory role in coping with appropriation concerns by providing incentives or clear sanctions in case of breach of contract, like penalties or liquidated damages for delay (Klein Woolthuis et al., 2005).

In these ways, contractual obligatoriness, or the threat of legal enforcement reduces the capability of contractors to deviate from obligations codified in the formal contract (Lumineau and Quelin, 2012). What's more, contractual obligatoriness changes the pay-off structure by increasing the cost of self-interest activities (Parkhe,

1993). When faced with opportunities of self-interest seeking, which might end up with serious consequences and loss, contractors may choose to abide by the contract after a cost-benefit analysis.

Thus, strong form opportunistic behavior, which breaches the contractual norms (terms, clauses and conditions), can be effectively curbed by detailed contract drafting in terms of obligatoriness function (Lu et al., 2016). Thus, Hypothesis 1 is advanced:

Hypothesis 1: Contractual obligatoriness is negatively associated with contractors' strong form opportunistic behavior.

Previous studies have suggested that incentives and penalties, as well as pricing and monitoring clauses like program and quality control should be included in contracts to restrict opportunism (Barthélemy and Quélin, 2006; Ujene, 2014). As the complexity of contractual monitoring increases, things related to observation and recording of performance become more convenient and transparent (Jensen and Meckling, 1992), narrowing the range around which contractors can seek self-interest with guile (Wathn and Heide, 2000). However, since the contractor's motivation for opportunism still exists, contractors may be encouraged to cut corners in spaces that are left unspecified within the contracts, without being observed or sanctioned. As Ghoshal and Moran (1996) put it, "when the balloon of opportunistic behavior is poked in one place by the blunt instrument of control, it readily yields but re-emerges elsewhere in ways that may make it more difficult and costly to detect and curtail". If the deviation behaviors would bring benefits without punishment, then the partner may seek self-interest in a less blatant way (Liu et al., 2014).

One important path that detailed monitoring in a contract induces more weak form opportunistic behaviors is through eroding goodwill trust between the client and the contractor. Goodwill trust refers to the degree of one's reliability in a risky exchange situation, based on benevolence, good faith, and caring about another party's welfare (Das and Teng, 2001; Nooteboom, 1996). Close monitoring in a formal contract may communicate a signal of distrust to the contractor, who is monitored by the owner through clauses regarding project quality or schedule. This type of surveillance-oriented governance mechanism may throw parties' goodwill into doubt (Das and Teng, 2001; Ghoshal and Moran, 1996) and may further erodes the process of goodwill trust development (Malhotra and Lumineau, 2011; Schweitzer et al., 2016). This will stimulate the contractors' sense of reactance for this obtrusive form of control (John, 1984; Kashyap et al., 2012) and promote inappropriate actions, especially actions that cannot be specified within contracts (Wuyts & Geyskens, 2005).

Therefore, we argue that although it can restrict the contractors' capability of performing opportunistic behavior explicitly, detailed contractual monitoring would divert opportunistic actions away from actions codified in the written contract and increase the frequency of weak form opportunistic behavior. Thus, the following hypothesis is developed.

Hypothesis 2: Contractual monitoring is positively associated with contractors' weak form opportunistic behavior.

Contracts may also act as 'knowledge repositories' (Mayer and Argyres, 2004) which facilitate coordination and may reduce the occurrence of weak form opportunistic behavior. Firstly, coordination clauses specify task assignments in greater detail, which reduces role ambiguity and cuts down the contractor's leeway to undertake opportunistic actions (Argyres et al., 2007). Similarly, contractual coordination helps to specify how parties should behave over time, curtailing adaptation problems (Buvik and John, 2000) and leaving little room for opportunistic interpretation. However, compared to control functions, provisions referring to coordination function are less externally enforceable, leaving little effect on strong form opportunistic behavior.

Secondly, researchers have pointed out that the curbing effect of contracts on opportunistic behavior is enhanced through detailed mutual contacts between the contract parties (Wuyts and Geyskens, 2005). If a communication framework and the interface of activities are clearly codified in the contract, the information exchange is enhanced and the transparency of the relationship is increased (Srinivasan and Brush, 2006). Thus, information asymmetry is reduced, restricting contractors' capability of implementing opportunistic behavior (Ali and Larimo, 2016).

More importantly, researchers have pointed out that contract design may psychologically affect how parties behave in a relationship (Weber et al., 2011). Unlike contractual control, which focuses on the negative facets of the relationship, contractual coordination acts as a 'meeting of the minds', and provides guidance on

326 the positive sides, like common goals and ways to achieve it (Klein Wolthuis et al.,
327 2005). Contractual coordination contributes to the development of goodwill trust.

328 Because of bounded rationality, contract parties don't plan for all potential
329 problems initially (Love et al., 2011), but set the rules of the game in detail by
330 establishing norms and procedures to coordinate on how to conduct the project.
331 Increased working details act as a kind of blueprint and reflect both parties' effort in
332 elaborating on the contract, sending a signal about their preparation and intention to
333 be loyal partners (Carson et al., 2006; Klein Wolthuis et al., 2005) to cooperate
334 efficiently and complete the project smoothly (Mayer and Argyres, 2004; Yang et al.,
335 2012).

336 Meanwhile, by creating channels through which disagreements will be solved,
337 coordination provisions help mitigate misunderstandings and enhance mutual
338 goodwill trust (Malhotra and Lumineau, 2011). Common expectations and goal
339 congruence help to curb motivation for behaving opportunistically (Dahlstrom and
340 Nygaard 1999, Kadefors, 2004), especially for actions that are unobservable or not
341 verifiable by a third party (Lumineau and Quelin, 2012; Srinivasan and Brush, 2006).

342 **Hypothesis 3**: Contractual coordination is negatively associated with contractors'
343 weak form opportunistic behavior.

344

Method

Sample and data collection

This research used a questionnaire survey to collect data from Chinese companies in the construction industry. A pilot test using semi-structured, in-depth interviews with three professors and 11 managers who specialize in contract management was conducted. Each interview lasted about an hour. These interviewees affirmed the practical importance of contracts for construction projects and helped the authors to refine the constructs behind the study and to ascertain the face validity of the measurements.

The final data collection process lasted about two months. Alumni who majored in and engaged in contract management were contacted to participate in the survey. Snowball sampling was also adopted to collect more qualified questionnaires conveniently. Note that we did not employ a random sampling strategy because for the unit of analysis, i.e. construction projects, it is difficult to identify the clear population of sampling. At the same time, comparing to stranger respondents, alumni have greater sense of responsibility to give detailed and accurate answers to the survey questions, which is conducive to ensure the quality of the survey data. In total, 362 informants from project owners (the party issuing the contract, including owners and general contractors as the owners of subcontractors) responded to the electronic questionnaire, and 295 valid questionnaires were obtained. To ensure the quality of the dataset, responses completed in less than 240 seconds were further eliminated, resulting in 262 valid questionnaires as the final sample. The types of project in the

dataset covered housing, road and bridge, port and waterway, water conservancy, municipal engineering, energy, telecommunication, industrial projects and others. Descriptive statistics for the sample including the distribution of working experience and professional qualification of the respondents and contract price are presented in **Table 1**.

In order to reduce the common method variance, the respondents were informed that their responses would be confidential, only to be used in academic research, and there was no standard answer for each question in the questionnaire. Harman's one-factor test was conducted to test for common method bias (Podsakoff et al., 2003). The model fit of one-factor model (χ^2/df=8.760, GFI=0.452, RMSEA=0.172, CFI=0.474, NFI=0.448, TLI=0.419) doesn't support the common-factor hypothesis, indicating that common method bias is not a significant problem in this research.

Measurement

Multi-item scales were used to operationalize variables except for control variables. A 7-point Likert scale with end points of "strongly disagree" and "strongly agree" was employed for measurement.

Opportunistic behavior

Based on Luo (2006) and Luo et al. (2015), four items were used to measure strong-form opportunistic behavior. Another four items for weak-form measurement were derived from those used by John (1984), Parkhe (1993) and Heide et al. (2007), with appropriate wording modifications to fit the research context. In order to avoid

388 social desirability bias of self-reports (Jap and Anderson 2003), respondents were
389 asked to assess their partner's behavior.

390 **Complexity of different contractual functions**

391 Contract complexity has been measured in an aggregate way (Poppo and Zenger,
392 2002) or by counting the total number of terms included in the contract (Lumineau
393 and Quélin, 2012; Parkhe, 1993). As subtle measurement of contractual complexity is
394 not available, the authors developed items to measure contractual complexity in
395 different functions, strictly following the measurement developing procedure
396 suggested by Churchill (1979). The measurement was based on construct definitions
397 and existing scales. Conditions of standard forms of construction contract such as the
398 FIDIC were referred to, making the measurement practicable in construction projects.
399 Scholars and experts with more than ten years' experience in contract management
400 were interviewed to discuss the measurement, item by item, to refine the literal
401 meaning of the measurement and ensure the face validity.

402 For the complexity of contractual obligatoriness, items were developed based on
403 Luo (2002), Wuyts and Geyskens (2005), and Ding et al. (2013). For the complexity
404 of contractual monitoring, previous works of Heide et al. (2007) and Chen and
405 Bharadwaj (2009) provided reference. And the work of Lumineau and Quelin (2012)
406 and Zhang et al. (2016) helped to develop definition and measurement for the
407 complexity of contractual coordination.

Goodwill trust

Trust is a complex phenomenon, and it is rather difficult to measure the dynamic level of trust within a survey. In order to investigate the effect of contractual content on the level of goodwill trust, this research focuses on the trust level after signing the contract, rather than after the observation of opportunistic behavior during construction period. The measurement of goodwill trust was adapted from previous works. Based on Jiang (2013) and Lui (2004), three items were used to measure the level of mutual goodwill trust after the signing of the contract. The time point of the level of goodwill trust is underlined in the questionnaire.

Control variables

Because a contractor's opportunistic behavior may be influenced by other factors outside the framework above, additional variables of less interest were incorporated.

Since *expectations of continuity* is related to both dependent and independent variables, it is controlled in this research to capture the shadow of the future (Parkhe, 1993; Schepker et al., 2014), measured with the item: "When contracting for this project, we expect to have further cooperation with this partner in the future."

Prior collaboration is controlled since it may relate to both dependent variables and independent variables (Liu et al., 2009; Liu et al., 2014). Thus, it is controlled in the model and measured by a single item: "Before contracting for this project, how often was the prior collaboration between your firm and the focal partner?" (Wang et al., 2017)

Contract price is also controlled as a proxy of project size or project complexity, as it will influence the complexity of contract (Benaroch et al., 2016; Lu et al., 2016).

Contract type is controlled in this research since it is related to the complexity of contract and trust (Laan et al., 2012). The informants are requested to choose from unit price, lump sum, cost plus fee and mixed contract type.

Results and Analysis

Construct reliability and validity

In order to assess the internal consistency and the reliability of the measurement, Cronbach's alpha of each construct was examined. The results show that the Cronbach's alpha values are all greater than 0.7, indicating good consistency and reliability.

A confirmatory factor analysis (CFA) was employed to further assess the construct validity of the measurement. In the CFA model in *Amos 22.0*, each item was linked to its corresponding construct, with the construct covariance freely estimated. The CFA results are shown in **Table 2.** The model fit indices (χ^2/df=1.754, GFI=0.894, RMSEA=0.054, CFI=0.953, NFI=0.898, TLI=0.944) show an acceptable fit of the data to the model. Composite reliability (CR) ranges from 0.755 to 0.893 and average variance extracted (AVE) are all above the 0.5 benchmark (except for contractual coordination, which is close to 0.5), indicating a good reliability as a supplement. Together with the factor loadings, which are all above or close to 0.6, convergent validity was demonstrated. Furthermore, as **Table 3** shows, the square roots of the AVE are greater than the correlations, demonstrating good discriminant

451 validity.

452 **Hypotheses testing**

453 Hierarchical regression analysis was employed to analyze the theoretical
454 framework. The variance inflation factors (VIF) for each variable ranged from 1.073
455 to 3.243, suggesting that multicollinearity is not a concern.

456 Control variables were first introduced into Model 1 and Model 3, with the three
457 dimensions of contractual complexity being added to the previous ones. As shown by
458 Model 2 (ΔR^2=0.054, $p<0.01$) and Model 5 (ΔR^2=0.051, $p<0.01$) in **Table 4**,
459 contractual complexity does have significant effects on contractors' opportunistic
460 behavior. More specifically, Model 2 shows that contractual obligatoriness has a
461 significant negative effect (β=-0.222, $p<0.01$) on strong form opportunistic behavior.
462 Thus, Hypothesis 1 is supported.

463 Model 5 shows that all three dimensions of contractual complexity have
464 significant effects on contractors' weak form opportunistic behavior. Specifically,
465 contractual monitoring has a significant positive impact (β=0.164, $p<0.05$) on weak
466 form opportunistic behavior, and contractual coordination has a significant negative
467 effect (β=-0.168, $p<0.05$). Consequently, Hypothesis 2 and 3 are supported.

468 **Additional analysis**

469 Apart from the above direct test on the proposed hypotheses, we conducted
470 several additional analyses to further exploit the information in our dataset.

471 When developing Hypothesis 2 (contractual monitoring influence weak form
472 opportunistic behaviors) and Hypothesis 3 (contractual coordination influence weak

form behaviors), we mainly employed goodwill trust between the collaborating parties as the reason leading to these relationships. Therefore, here we conduct a mediation test to examine if goodwill trust act as the underlying mechanism explaining the relationship in Hypotheses 2 and 3.

As suggested by Baron and Kenny, three conditions are necessary for the presence of a mediation effect: Firstly, the independent variable should be significantly related with the dependent variable. Secondly, the independent variable should significantly affect the mediation variable. Thirdly, when controlling the influence of the independent variable, the mediator still has a significant effect on the dependent variable. As for the mediation relationship in this research, the main effects have already been tested in Model 2 and 5. As Model 8 shows, contractual coordination has a significant positive relationship (β =0.186, $p<0.05$) with goodwill trust, and a marginally positive effect (β =0.140, $p<0.1$) is found for contractual monitoring. Furthermore, Model 9 shows a significant impact of goodwill trust on contractors' weak form opportunistic behavior after controlling for all contractual dimensions simultaneously, and a nonsignificant effect of coordination, which provides evidence for the mediation effect of goodwill trust on the path from contractual coordination to contractors' weak form opportunistic behavior.

As the statistical power of the three-step test might be low (Hayes, 2009), Sobel's test based on bootstrapping is used to determine whether the indirect effects of the two dimensions of contractual complexity on contractors' opportunistic behavior via goodwill trust are different from zero, especially for the path of

monitoring. The process[1] suggested by Hayes is employed using *SPSS 23.0*. The Z value ($Z=-3.543$, $p<0.01$) in Sobel's test confirmed the mediating effect of goodwill trust between the complexity of contractual coordination and weak form opportunistic behavior. Meanwhile, the other Sobel's test indicates a significant indirect effect ($Z=-3.856$. $p<0.01$), suggesting the mediation effect of goodwill trust between the complexity of contractual monitoring and weak form opportunistic behavior, but in the negative direction. Taking together the results of the three-step analysis and Sobel's test on bootstrapping, we conclude that goodwill trust is a significant mediator explaining how contractual coordination influence weak form opportunistic behaviors, while it is not a mediator for the relationship between contractual monitoring and weak form opportunistic behaviors.

Secondly, we conducted an analysis to explore if the three contractual mechanisms have interactive effects on contractor's opportunistic behaviors. We first centralized the variables "contractual obligatoriness", "contractual monitoring", and "contractual coordination", and then generated three interaction terms by multiplying the centralized variables pairwise. Then we incorporated these three interaction terms into the regression model. The results are shown in Model 3 and Model 6 in Table 4. It turns out that there is no significant interactive effect of the three contractual mechanisms on either type of opportunistic behavior, as neither of the interactive terms in Model 3 or Model 6 is statistically significant. The results indicate that

[1] Scholars can download the process for SPSS from the website: http://afhayes.com/index.html

neither of the three mechanisms amplifies or weakens the other two mechanisms' influence on opportunistic behaviors.

Thirdly, we pay attention to the potential relationships for which we did not develop formal hypotheses. For strong form opportunistic behavior, we hypothesize that contractual obligatoriness will have a negative impact, which implies that we do not expect significant influence of monitoring and coordination on it. The results in Model 2 supports this notion (for contractual monitoring, β =0.061, p>0.05; for contractual coordination β =-0.074, p>0.05). For weak form opportunistic behavior, we hypothesize that contractual monitoring will have a positive influence, while contractual coordination will have a negative influence, which implies we expect no effect of contractual obligatoriness on it. However, Model 5 shows a significant negative influence of contractual obligatoriness on contractor's opportunistic behaviors (β =-0.174, p<0.05). Another related important observation is that contractual obligatoriness is significantly positively related with goodwill trust (β =0.148, p>0.05). These unexpected results will be further discussed in the next section.

Discussion and Conclusion

Discussion

As predicted in H1, the complexity of contractual obligatoriness is negatively related to contractors' strong form opportunistic behavior. Consistent with the traditional function of contractual safeguarding, this research has verified that it is the obligatoriness that acts as the last line of defense in safeguarding investment against

opportunism. As predicted in H2 and H3, contractual monitoring and coordination have respective effects on contractors' weak form opportunistic behavior. The empirical results echo those of the exploratory work of Lumineau and Quélin (2012). Previous studies have demonstrated that the contract plays only a limited role in weak form opportunism since it involves behaviors that are not in breach of the contract directly (Lu et al., 2016). This research has supplemented those findings by verifying the curbing effect of contractual coordination on weak form opportunistic behavior.

Moreover, we explored if contractual monitoring and coordination also have indirect mediated effects on contractors' weak form opportunistic behavior through goodwill trust. Consequently, the empirical results show that goodwill trust mediates the relationship between the complexity of contractual coordination and contractors' weak form opportunistic behavior. The empirical result is consistent with the findings that contractual coordination helps to reduce the level of conflict through communication and common expectations (Schilke and Lumineau, 2018). This way, in addition to mitigating performance risks, contractual coordination reflects a social consensus and acts as reinforcement of specific behaviors or exchange patterns, which may play the role of relational alleviator in dealing with weak form opportunistic behavior. However, the mediation effect on the relationship between the complexity of contractual monitoring and weak form opportunistic behavior is not supported in the expected direction. From the three-step procedure of the mediation test, it is obvious to see that contractual monitoring is marginally positively related to goodwill trust. Previous studies have discussed the contract-trust relationship in a

559 complementary or substitutive way (Cao and Lumineau, 2014). Specifically,
560 contractual control may crowd out goodwill trust while contractual coordination may
561 strengthen goodwill trust (Malhotra and Lumineau, 2011). This research argues that
562 close monitoring may signal distrust between the contract parties. Nevertheless, there
563 is no significant negative relationship between contractual monitoring and goodwill
564 trust. One possible explanation would be that construction projects are commonly
565 complex and contracts designed to govern these transactions are inevitably complex
566 and specific.

567 Finally, as presented in the previous section, we observed an expected negative
568 relationship between contractual obligatoriness and weak form opportunistic
569 behaviors. The reason might be due to the positive relationship between contractual
570 obligatoriness and goodwill trust observed in Model 8. From these results, we suggest
571 that scholars should be more careful when talk about the relationship between formal
572 contract and goodwill trust in construction projects. Actually, many scholars argue
573 that one important drawback of detailed formal contract is that it may signal a level of
574 distrust, and thus hamper the goodwill between the transacting parties (Ghoshal and
575 Moran, 1996; Cao and Lumineau, 2015). However, our data shows that in
576 construction projects, the formal contract instead has a strong direct complementary
577 effect on goodwill trust. We conjecture that the reason might be that the construction
578 projects usually have a large amount of contract price. Under such important
579 transactions (both strategically and financially), the parties will regard detailed
580 contractual governance mechanisms as understandable and even required, rather than

581 feeling been distrusted. Furthermore, in such important transactions, the detailed
582 formal contract can help to ease the worries of the parties about the potential hazards
583 that overshadow their investments, and thus can build a strong basis for the parties to
584 in turn construct their goodwill and trustworthiness. Driving by these postulations, we
585 suggest that this might be an interesting research opportunity to generalize the
586 conditions (e.g. strategic importance or price) where formal contract complement
587 goodwill trust instead of hamper it.

588 **Conclusion and Implications**

589 This study attempts to examine the effects of contractual complexity on
590 contractors' strong and weak form opportunistic behavior, and also verifies the
591 mediating role of goodwill trust in construction projects. This research contributes to
592 the contract management literature and interorganizational relationship governance
593 literature in the following ways.

594 Firstly, by answering the question "how does contractual governance matter to
595 deal with opportunistic behavior", this research differentiates the effects of distinct
596 contractual functions on different types of opportunistic behavior. In this way, this
597 research responds to previous works (Lumineau and Quélin, 2012) and speaks to the
598 debate regarding the contract-opportunism relationship. It is showed that neither
599 contractual governance and opportunistic behavior is a single-facet construct, and
600 investigating in a more nuanced way can help to reconcile the contradictory findings
601 in the current literature. Secondly, combining the functional view of contracts with the
602 management control literature, this research divides the control function into

603 contractual obligatoriness and monitoring, and show that they are using different
604 logics in controlling partner's behavior and have divergent properties that are worth
605 exploring. Thirdly, this research highlights the salient effect of goodwill trust in
606 curbing weak form opportunistic behaviors. Previous scholars have suggested, also is
607 verified by this research, that formal contract has very limited effect in dealing with
608 weak form opportunism (Lumineau and Quelin, 2012). Given the implicit nature of
609 weak form opportunistic behaviors, this research suggests that the best strategy to deal
610 with them is to reduce the *motivation* to behave opportunistically rather than limiting
611 the *ability*. Therefore, it is necessary to further explore the important role of relational
612 governance mechanisms in curbing weak form opportunism.

613 This research also has managerial implications. Firstly, it provides guidance for
614 contract designing, since the results confirm that later problems can be mitigated by
615 doing things differently at the "front end" (Parkhe, 1993). Conventional wisdom
616 posits that managers should design more explicit contracts to curb both parties'
617 opportunistic behavior. However, this research indicates that construction companies
618 should be cautious in using different contractual functions. On the one hand, the
619 binding force of the contract should be strengthened appropriately to generate
620 deterrent force through obligatoriness. On the other hand, managers should pay
621 attention to monitoring-based contractual provisions which have the potential of
622 nurturing contractors' opportunistic behavior in weak form. It does not imply that
623 monitoring is not necessary in construction projects, but suggests avoiding intensive
624 use of monitoring-based contents and that monitoring alone is not enough. Owners

should let coordination go with them to reduce weak form opportunism from motivation. At the same time, penalty-related contents should be added to monitoring functions to curb opportunism from capability. Therefore, in line with the goal of mitigating weak form opportunism, maybe owners are suggested to leave more room for contractors and for coordination. What's more, since the improvement process of contracting may curb opportunistic behavior in some ways, learning from previous contracts, especially failed ones, is encouraged for owners. Secondly, contract managers should keep a weather eye on practical behaviors or conflicts derived from opportunism and employ pointed mechanism. With regard to mitigating contractors' weak form opportunistic behavior, which takes place more frequently according to the statistical data, relational governance like trust is more preferable. Coordination efforts or shared norms should be developed and enhanced through contracts or someway else in dealing with this type of opportunistic behavior, which is less observable but more durable (Luo et al., 2015).

Limitations and Suggestions for Future Research

This study has several limitations that provide avenues for further research. Firstly, this research regards contractual complexity as a single characteristic of governance and doesn't take into consideration the matching between project features and contractual complexity. This research has considered control variables like contract price as a proxy of project features. Future studies are encouraged to learn about how different combinations of transactional characteristics are best matched with different combinations of contractual provisions in dealing with opportunism.

Secondly, the companies in which the informants work are mainly large engineering enterprises in China, whose level of contract management or performance of projects may be higher than the average. Although this research has employed contract price as a control variable, it is suggested to sampling from small-scale projects as well and consider the relationship between the key constructs in a larger variation of project scales. Thirdly, learning effect may make the contracts more and more complex to recoup loss from opportunistic behavior due to incompleteness of previous contracts. And the level of trust is also dynamic. However, cross-sectional sample design constrains the capacity to carefully examine the relationship between contractual complexity, trust and opportunistic behavior. Thus, longitudinal data or experimental methods are needed to fully test the dynamics of this relationship. Finally, this research did not use instrumental variables to formally address the potential endogeneity issue. As the contractual mechanisms are not designed randomly, the independent and dependent variables of this research may be influenced simultaneously by some missing variables. Although we deliberately controlled the influence of expectations of continuity, prior collaboration, and contract price because they may relate to both contractual design and opportunistic behaviors, the potential endogeneity issue might nevertheless limit the contribution of this research.

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